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THE
CASE FOR VACCINATION

BY
E. BROWN, M.R.C.S., L.R.C.P.



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P R E F A C E

THIS little book is intended mainly for the public, the idea of the author being to lay before them in as brief a form as possible the reasons which induce the medical profession to uphold the practice of vaccination.

The writer makes no claim to originality—which, indeed, is out of place in such a book—but has simply collected the facts and placed them together in a convenient form.

It is also hoped that it may be of some little use to those practitioners who wish to reconsider the subject, and who may not have the necessary time to consult works of reference.

E. B.

BROMLEY, KENT,
March 1st, 1902.

THE CASE FOR VACCINATION

It seems strange that in the beginning of the twentieth century, after more than a century of vaccination, and in England, the land of its birth, it should be necessary to write a defence of the practice. Yet that such a defence is necessary—at any rate, as far as the public are concerned—can scarcely be doubted.

In this, as is, unfortunately, only too true in other matters where other countries have advanced, England has either retrograded or remained stationary.

Whilst the traveller in France encounters, as he lands at Boulogne, the statue erected by grateful France to the memory of Edward Jenner, the discoverer of vaccination; whilst Germany has not only made vaccination compulsory on all her people, but revaccination as well; whilst every civilized State has adopted the practice, in England alone a 'not very brave Government' has yielded to popular clamour, and has allowed every man and every parent to say whether or not, in his opinion, he himself or his child shall be vaccinated.

What is the cause of this? What are the factors that have been silently and steadily working in such a way that the strongest Government of modern times, against its own views and against the views of its responsible advisers, should have introduced a measure which leaves every man, however ignorant and however misguided, at liberty to decide a question which in ninety-nine cases out of a hundred he has neither the necessary knowledge nor ability to decide?

Vaccination in England, but not in Scotland, is unpopular.

On that question there can be no two opinions. Whilst the

great majority of those who live by their brains voluntarily accept the view that it is a matter about which the opinion of the medical profession is likely to be of more value than their own, the great bulk of the population—the working classes—whose brains are not so highly trained, are either hostile or indifferent.

There are several reasons for this being the case.

1. In the first place, the average Englishman is naturally a person of strong individual convictions, who objects to having the opinion of any authority, however eminent, forced upon him. He resents any interference with his own personal liberty for any cause whatever. He is not like the more tractable German, who throughout his life is treated as a child by a paternal Government, and allows other people to do his thinking for him.

The same spirit which leads him to oppose conscription, the same spirit which leads him to oppose the authority of the State, as opposed to the authority of the individual, leads him to reject the practice of vaccination. He is a strong individualist.

I wonder how many societies there are in this country whose sole *raison d'être* is to be anti-something—against some constituted authority.

This, then, I believe, is one reason why vaccination is so unpopular. I think it will frequently be found that those who are opposed to vaccination are also opposed to many other orthodox views, whether it be to vivisection, or to the use of tobacco or alcohol, or to an established Church, or to flesh meat, or any of the hundred and one things which a section of modern England tilts against. I use this comparison with no offensive meaning whatever, but simply to show that in a certain class of minds there is a natural tendency to oppose.

The working man objects to be compelled to submit to a practice which is generally an inconvenience at the least, and the necessity for which, except when there happens to be an epidemic of small-pox about, appears to him somewhat remote.

2. Secondly, we must put pure ignorance as a cause.

The ordinary man cannot and will not study blue-books and statistics in order to ascertain whether vaccination has any value or not. All his information on the subject is one-sided. He

reads statements in certain papers, frequently of an unfair and misleading character, and straightway comes to the conclusion that vaccination is a useless fad—an invention of the medical profession to extract fees, or even, as I have known the more ignorant to believe, a practice done out of pure perversity.

He has neither the means nor the time to study the question for himself. No popular treatise deals with vaccination as a means of diminishing the liability to and virulence of small-pox, but many pamphlets trumpet forth its alleged dangers.

One has only to glance at the reasons given by that curious invention of the present Government, 'the conscientious objector,' to see the extraordinary ignorance that prevails amongst the masses in regard to vaccination. It is not necessary to dwell upon this point, for every reader of the daily paper must have seen numerous instances which bear out this contention.

I have frequently made inquiries amongst women of the poorer and less educated classes of the community, and have been amazed at the reasons they have given as to why the law compels their children to be vaccinated. Some candidly confessed their ignorance; others thought it was done to prevent the occurrence of measles, or of whooping-cough, or of eczema; others saw in it simply the tyranny of the authorities.

This can be partly accounted for by the comparative infrequency of small-pox epidemics at the present time, for the great majority of towns in England have practically escaped its ravages for a generation.

But a far more powerful cause for this ignorance is the attitude of the medical profession, which attitude, indeed, constitutes the third reason for the unpopularity of vaccination.

There is a certain aloofness amongst members of that profession in regard to matters of public interest. They do not interest themselves in public life so freely as they do in certain other countries—France, for example. With them vaccination is a *chose jugée*, and they do not care to discuss a subject concerning which they maintain the view—probably a correct view in the majority of cases—that laymen have not the necessary knowledge to form an opinion.

Thus the field has been left free to the anti-vaccinationist, who has not hesitated to avail himself of the opportunity; and as the

doctors, from motives of professional dignity, have not replied, their silence has been construed as a sign of weakness.

The public have never yet been presented with a clear account of the case for vaccination treated in a popular way. Books, indeed, have been written in abundance for medical men, but the layman who wishes to study the subject can only hear one side of the question. Is it a wonder, then, that they have in so many cases been led to an erroneous conclusion?

4 Fourthly, owing to the tender age at which it is necessary to perform primary vaccination, the majority of women are at heart anti-vaccinationists. They have to suffer the discomfort and inconvenience which the care of a baby whose arm has just taken necessarily involves. Vaccination to them is a present trial—small-pox but a remote possibility.

5 Fifthly, the claims originally made for vaccination by Jenner and his immediate successors were too great, and events have not justified them. They held that one single vaccination conferred lifelong immunity, a prophecy made before the time necessary to establish its truth had elapsed. This has long been apparent to everyone to be untrue, but the mere fact that such a claim was made and then abandoned has weakened the cause of vaccination. It is never a good thing to have to change one's position, in however small a degree. Jenner and his compatriots were apparently unaware of the fact that even small-pox itself does not confer absolute immunity from a subsequent attack of that disease. They forgot that scarlet fever and measles, and, indeed, practically every infectious disease, may repeat itself. Therefore they could hardly have expected vaccination to do more than an attack of small-pox itself does.

6 Lastly, there are the alleged dangers of the operation. These deserve more than a passing notice, and will be dealt with later on in detail. It is sufficient now to say that, with the other five causes already mentioned, they have constituted ample grounds for the present state of opinion.

Now let us see what vaccination really is.

Vaccinia, or cow-pox, is a disease affecting milch-cows, and is characterized by an eruption on the udder and teats. The disease can be communicated from the cow to man, and dairymaids and those engaged in milking cows affected with cow-pox are apt to

have sores on their hands and elsewhere, accompanied by slight febrile symptoms. These sores are the local manifestations of cow-pox, the virus from the eruption being introduced through some scratch or abrasion on the skin.

Towards the close of the eighteenth century a belief existed among dairy folk that those who had taken the cow-pox were insusceptible to small-pox, and in the year 1774 one Jesty, a farmer, actually introduced the matter of cow-pox into the systems of his family for the purpose of testing this belief.

It was reserved, however, for Edward Jenner, a humble country practitioner in Gloucestershire, to place this belief on a scientific basis, and to show that vaccinia, or cow-pox, is protective against small-pox, and to be the means of introducing a practice which has been adopted by every civilized community in the world.

Jenner, like others, had noticed the fact that those who had contracted cow-pox from handling cows failed to contract natural small-pox. This led him to take a step further, and to see whether those who had contracted cow-pox were susceptible to small-pox by inoculation. During the eighteenth century inoculation—*i.e.*, the artificial production of small-pox—had been introduced into Europe from the East by Lady Mary Wortley Montagu, and had been extensively adopted in this country. The idea was to create a *milder* form of small-pox than the natural disease, and in this respect inoculation was successful. Unfortunately, however, the inoculated form of small-pox was infectious. This, then, was inoculation.

Now, in some cases where a doubt arose as to whether the disease of small-pox had actually been transmitted by inoculation or not, it was the custom to submit the patient to a *second* inoculation, with the purpose of seeing whether the first had really been successful. If small-pox had not been transmitted at the first inoculation, the second one would convey it; if, however, it had already been contracted, the second inoculation failed to excite anything more than a slight local inflammation, which rapidly died away. No vesicles appeared, and no symptoms, local or constitutional. This process was known as the 'variola test,' and was in common use.

Jenner then applied this test to those who had already contracted cow-pox, and the result was the same as in those cases

where a person had already suffered from natural or inoculated small-pox. From this he inferred that cow-pox exercised the same protective influence against small-pox that small-pox itself did against subsequent attacks of the latter disease.

His next step was to produce cow-pox artificially in man, and then submit the case to the 'variolous test.' This artificial production of cow-pox is called vaccination.

It was not until 1796, however, after many years' study and observation of the matter, that Jenner performed the crucial experiment of injecting the virus of small-pox into a boy whom he had previously vaccinated. This boy was then inoculated with the matter taken from small-pox pustules six weeks after he had been vaccinated with cow-pox, and the appearances subsequently presented by the wound were the same as commonly followed the inoculation of persons who had previously had small-pox—*i.e.*, slight local inflammation, which rapidly died away. No vesicles appeared, and no constitutional symptoms.

Some months afterwards the boy was again inoculated with small-pox matter and no result followed—that is, the boy failed to contract the disease.

Subsequently Jenner inoculated others with cow-pox, and applied to them the 'variolous test'—*i.e.*, he inoculated them with small-pox matter—and again no result except the slight inflammation followed. These also failed to contract small-pox.

In 1798 Jenner published his inquiry into the causes and effects of the *variola vaccinae*, and from this date the practice of vaccination spread widely and rapidly over Europe and America.

In 1800 many of the leading physicians of London signified their adhesion to the doctrine of vaccination, and the provincial cities soon followed their example.

In 1802 a Committee of the House of Commons reported on Jenner's discovery, and, after examining many experienced witnesses, declared that the evidence showed that vaccination did afford protection against small-pox, and introduced a milder disorder in place of the inoculated small-pox, 'which disorder (vaccination) is not capable of being communicated by contagion.' During the preceding century, as I have already pointed out, the practice of inoculating persons with small-pox itself, with the idea

of giving them a milder form of the malady, had been very generally adopted.

In 1807 the Royal College of Physicians, at the command of the King, made an exhaustive inquiry into the subject; the results of several 100,000 cases were investigated, and the conclusion arrived at was that, though vaccination did not always confer absolute protection against small-pox, yet it did afford great security; and, further, that in those cases where small-pox had succeeded vaccination the disease was of a far milder and altogether different type from that generally observed in those who had not been subjected to the process of vaccination.

Looking abroad, we find that in Denmark a number of the leading medical men in Copenhagen formed a committee in 1804 in order to investigate the results of vaccination, and about the same time a Danish Royal Commission was formed for the same purpose. Both committees arrived at the same unanimous conclusion—that vaccination was a protection against small-pox—and in 1810 Denmark made vaccination compulsory.

Sweden made vaccination compulsory in 1816, and fined recalcitrants. In 1825 70 per cent. of those born in this country were vaccinated.

Germany adopted the practice more extensively than any other country, and in 1874 went a step further, and made revaccination compulsory as well.

In every country in Europe, indeed, the practice spread rapidly.

Thus it will be seen that vaccination was adopted, after careful inquiry, by all the leading European States, and yet we are asked by some to believe that the experience of every one of these countries was a mistake, that Jenner was a colossal fraud, and his whole system absolutely worthless. Truly the opponents of vaccination make a great strain on one's reasoning power; we are asked to indict not merely the intelligence and wisdom of our own country, but of the educated portion of the entire civilized world.

Let us now turn for a moment to the development of vaccination in England. In 1840 an Act was passed to extend the practice of vaccination, but it was not yet made compulsory.

In 1853, however, an Act to extend and make compulsory the

practice of vaccination was passed through both Houses without opposition or division. Compulsory primary vaccination existed from 1853 until 1898, but it cannot be said that the law during the latter part of this period was properly enforced. Subsequent Acts (1858 and 1867) amended and consolidated the Bill of 1853, and no fundamental alteration was made in the law until the year 1898, when, as a result of the report of the Royal Commission's Report, the 'conscientious objector' was invented, and calf lymph substituted for arm-to-arm vaccination, which had hitherto been the usual method.

According to the law as it stands at present, any parent who desires that his child shall remain unvaccinated must satisfy a magistrate that he has a conscientious objection to vaccination, and this he must do before the child reaches the age of four months, otherwise the law remains in force.

↓ The Royal Commission to inquire into the whole question of vaccination was appointed in 1889; it finished its labours and issued its report in 1898.

The Commission consisted of the following members :

Lord Herschel, Chairman ;

*Sir James Paget ;

Sir Charles Dalrymple ;

*Sir William Guyer Hunter ;

Sir Edwin Galsworthy ;

*Sir William Savory, President of the Royal
College of Physicians ;

Charles Bradlaugh ;

*John Syer Bristowe ;

†*William Job Collins ;

John Dugdale ;

Michael Foster ;

*Jonathan Hutchinson ;

† James Allanson Picton ;

Samuel Whitbread ;

F. Meadows White.

Those names marked with an asterisk are the names of medical men ; those marked † were known anti-vaccinationists.

Of the members, three—Mr. Bradlaugh, Sir William Savory

and Dr. Bristowe—died during the sitting of the Commission. The place of Mr. Bradlaugh was taken by Mr. J. A. Bright.

A word as to the personnel of the Commission.

Of the fifteen members, six were doctors (one of these being a known opponent of vaccination); and another—Mr. (now Sir) Michael Foster, Secretary of the Royal Society—is one of the most distinguished physiologists of Europe; the rest were lay men, including two lawyers.

It should be noticed that only a third of the Commission were medical men, surely not an unduly high proportion, considering the nature of the subject under investigation; nevertheless, there were not wanting those who cavilled at the presence of even this small number of doctors. One may presume only a committee of known opponents of vaccination would satisfy some minds. Then, truly, it would be an impartial jury!

The points which the Commission were requested to investigate were:

‘To inquire and report as to—

‘1. The effect of vaccination in reducing the prevalence of, and mortality from, small-pox.

‘2. What means, other than vaccination, can be used for diminishing the prevalence of small-pox, and how far such means could be relied on in place of vaccination.

‘3. The objections made to vaccination on the ground of injurious effects alleged to result therefrom, and the nature and extent of any injurious effects which do, in fact, so result.

‘4. Whether any, and, if so, what, means should be adopted for preventing or lessening the ill effects, if any, resulting from vaccination; and whether, and, if so, by what means, vaccination with animal vaccine should be further facilitated as a part of public vaccination.

‘5. Whether any alterations should be made in the arrangements and proceedings for securing the performance of vaccination, and, in particular, in the provisions of the Vaccination Acts with respect to prosecutions for non-compliance with that law.’

Let us take 1, 3, and 4 of these propositions seriatim, and see what was the verdict of the Commissioners on each, and on what evidence that verdict was founded.

1. THE EFFECT OF VACCINATION IN REDUCING THE PREVALENCE OF, AND MORTALITY FROM, SMALL-POX.

First let us take the question of the prevalence of small-pox. Now, amidst all the discussion that has taken place over this question of vaccination, there is one point that admits of no dispute whatever. Even the most bitter opponents of vaccination are compelled to admit that at the present day small-pox is a far less prevalent disease in England than it was a hundred, a hundred and fifty, or two hundred years ago. This, then, is agreed upon—indeed, it were hardly worth while to quote figures to prove this, except that such figures will show the reader what a fearful scourge small-pox once was.

During the years 1681-90 the average yearly death-rate from small-pox in London was 3·1 per 1,000; the death-rate from all causes combined at the same period was 42 per 1,000—that is to say, out of every 13 deaths 1 was due to small-pox. I will leave the reader to judge for himself whether the death-rate from small-pox at the present day amounts to 1 out of 13.

In the years 1746-55 the yearly mortality from small-pox per 1,000 deaths was 3; that of deaths from all causes combined was 35·5 per 1,000. Here the proportion was 1 in 12. Every twelfth death was due to small-pox.

During the seventeenth and eighteenth centuries the yearly mortality from small-pox was generally 3, 4, and 5 per 1,000—rarely less than 2, hardly ever more than 5.

Now let us see what an *epidemic* of small-pox was like in those days.

In Chester, in 1774, out of a population of 14,713, there occurred 1,202 cases of small-pox. Of these, 202 died. Here about one-twelfth of the population were attacked.

At Warrington, in 1773, out of a population of 8,000, there were 211 deaths from small-pox; the total number of deaths from all causes combined during the same year was 473—that is, between one-third and one-half of the deaths in Warrington were due to small-pox in 1773.

At Ware, in 1722, out of a population of 2,515, 1,601 persons had previously had small-pox, leaving only 914 susceptible persons. Of these, 612 were attacked and 72 died.

It is unnecessary to go further, and show what ravages the disease caused. What was the mortality of small-pox in these pre-vaccination days?

In the London small-pox hospitals, during the years 1746-63, it was 25 per cent. In various epidemics it ranged from 20 to 36 per cent. It was terribly fatal amongst children, in striking contrast to its behaviour in the nineteenth century, when its fatality amongst children was far less than amongst adults.

Haygarth, a well-known eighteenth-century authority, says 'half as many die of small-pox as of all other diseases.'

This, then, was small-pox prior to the era of vaccination.

Granted, then, that small-pox has undergone a continuous decline in England during the last hundred years, the next point to consider is what has been the cause of this decline.

Now, the decline is coincident with the period during which vaccination has been practised in Europe. Jenner made his discovery in 1796, and vaccination became general during the first quarter of the nineteenth century. Small-pox has continuously declined since about the year 1800. Is this merely a coincidence—an unusual coincidence, it must be admitted—or is it a case of cause and effect?

The unanimous answer of the medical profession in every country is that the decline in the prevalence of small-pox is due to the practice of vaccination. On the other hand, there are those—almost invariably laymen, be it said—who utterly deny that vaccination has had any influence on the admitted decline in the prevalence of small-pox, and maintain that the decline of that disease has been due to improved sanitary methods, greater cleanliness, better drainage, etc.

Now, what are the facts? Can this alternative argument be supported by any conclusive evidence? In the opinion of the Commission it could not be; indeed, they showed that facts told the other way.

In the first place, there is no evidence whatever to show that improved sanitation differentiated the first quarter of the nineteenth century from the last quarter of the eighteenth century in any way comparable to the decline in small-pox mortality following the introduction of vaccination.

Let us put the same facts in the form of a little table for the sake of greater clearness :

1775-1800.—Small-pox very prevalent. Vaccination unknown.	} Sanitary conditions practically unchanged.
1800-1825.—Small-pox far less prevalent. Vaccination generally practised.	

Date of discovery of vaccination 1796.

Again I repeat, If vaccination is a useless practice, is not the coincidence an extraordinary one ?

2. Secondly, the decline in small-pox mortality was a general one. It occurred equally in countries where the sanitary arrangements varied widely. If the decline was due to improved sanitary arrangements, we should have expected some places to show a much greater decline than others ; yet it was not so. In fact, in some countries where the prevalence of small-pox has declined, *insanitation*—if we may coin such a word—is the rule even at the present day.

3. Thirdly, during the eighteenth century small-pox attacked with equal severity the most sanitary and the most insanitary places (*e.g.*, Chester and London, Chester being almost a model town, and London the very reverse).

4. Fourthly, if improved sanitary conditions have, as the opponents of vaccination contend, accounted for the decline in the prevalence of small-pox, these same conditions should have affected the prevalence of other infectious and contagious diseases, such as diphtheria, measles, scarlet fever, and whooping-cough.

Have they done so ?

Take the case of measles first.

Let the reader examine the following table ; he will see at once that improved sanitary conditions have had little or no effect on the prevalence of, and mortality from, measles.

There is here nothing like the continuous decline shown by small-pox.

ENGLAND AND WALES.

Year.	Deaths from Measles to every 100,000 living.	Year.	Deaths from Measles to every 100,000 living.
1838 . . .	43	1867 . . .	30
1839 . . .	71	1868 . . .	53
1840 . . .	59	1869 . . .	46
		1870 . . .	34
1841 . . .	43		
1842 . . .	54	1871 . . .	41
1843 . . .	} Causes of death not abstracted by Registrar- General.	1872 . . .	37
1844 . . .		1873 . . .	32
1845 . . .		1874 . . .	52
1846 . . .		1875 . . .	26
1847 . . .		1876 . . .	41
1848 . . .	51	1877 . . .	37
1849 . . .	40	1878 . . .	31
1850 . . .	31	1879 . . .	36
	40	1880 . . .	48
1851 . . .	52		
1852 . . .	32	1881 . . .	28
1853 . . .	27	1882 . . .	48
1854 . . .	50	1883 . . .	35
1855 . . .	39	1884 . . .	42
1856 . . .	37	1885 . . .	53
1857 . . .	31	1886 . . .	43
1858 . . .	48	1887 . . .	59
1859 . . .	49	1888 . . .	35
1860 . . .	48	1889 . . .	52
		1890 . . .	44
1861 . . .	45		
1862 . . .	48	1891 . . .	44
1863 . . .	55	1892 . . .	46
1864 . . .	40	1893 . . .	37
1865 . . .	41	1894 . . .	39
1866 . . .	51		

Scotland and Ireland tell the same tale, and so does our every-day experience. Measles now is as rife as ever.

Now let us turn to the case of scarlet fever and diphtheria.

The following table shows the death-rate per 100,000 living from these two diseases :

THE CASE FOR VACCINATION

ENGLAND AND WALES.

Year.	Deaths from Scarlet Fever to every 100,000 living.	Deaths from Diphtheria to every 100,000 living.	Year.	Deaths from Scarlet Fever to every 100,000 living.	Deaths from Diphtheria to every 100,000 living.
1838 .	38		1867 .	57	12
1839 .	67		1868 .	100	14
1840 .	126		1869 .	124	12
			1870 .	145	12
1841 .	89				
1842 .	79		1871 .	82	11
1843 .	Causes of death not abstracted by Regis- trar-General.		1872 .	52	9
1844 .			1873 .	56	11
1845 .			1874 .	105	15
1846 .			1875 .	85	14
1847 .			1876 .	69	13
1848 .	86	1877 .	59	11	
1849 .	118	1878 .	75	14	
1850 .	75	1879 .	69	12	
	75	1880 .	68	11	
1851 .	76				
1852 .	104		1881 .	55	12
1853 .	85		1882 .	52	15
1854 .	100		1883 .	47	16
			1884 .	40	19
1855 .	89	2	1885 .	23	16
1856 .	71	3	1886 .	22	15
1857 .	65	8	1887 .	28	16
1858 .	121	34	1888 .	23	17
1859 .	98	52	1889 .	24	19
1860 .	49	26	1890 .	24	18
1861 .	45	23	1891 .	17	17
1862 .	173	24	1892 .	19	22
1863 .	148	32	1893 .	24	32
1864 .	42	26	1894 .	17	29
1865 .	84	20			
1866 .	55	14			

Here is no decline at all comparable to that exhibited by small-pox. True, scarlet fever shows a decline since about 1884 (although the Metropolitan hospitals are once more full of cases),

but the decline from small-pox dates from 1800. How is it that, if improved sanitary methods affected both diseases, it did not do so during the same period? How is it that it affects one disease only since 1884, and the other for a whole century? How can one answer this question unless some other cause—vaccination, we contend—was at work in the case of small-pox? Lastly, the prevalence of whooping-cough is as great as ever.

A great deal has been made of the fact that diseases classed under the general heading of 'fevers' have shown a great decrease during the last hundred years, the implication being that small-pox *may* have declined from similar causes. There is, however, no true analogy between small-pox and 'fevers.' The term 'fevers' formerly included many different diseases, which improvements in diagnosis now enable us to differentiate. The chief diseases classed as fevers are: (1) Typhoid or enteric, (2) typhus, (3) malarial fevers.

The first of these—typhoid—is communicable *only* through the excreta, and the disease is largely water-borne. Therefore it is obvious that improved sanitation, and more especially better water-supply, would have a marked effect in diminishing the prevalence of such a disease, whereas there is no evidence whatever to connect the prevalence of small-pox with an impure water-supply or the imperfect removal of excreta.

Secondly, typhus, or gaol-fever, now almost unknown in England, was always found in connection with dark, ill-ventilated houses and defective nutrition. There is nothing to show that the prevalence of small-pox was largely influenced by these conditions.

Thirdly, malarial fevers have disappeared, simply through the improved drainage of marshy lands.

Therefore we find that the diminution of 'fevers' can be readily explained, and the reasons which account for their diminution do not influence small-pox.

There is one other and very important feature of the diminished death-rate of small-pox to which we wish to draw attention: it is that such death-rate has not diminished equally among all ages of the population. During the eighteenth century small-pox was terribly fatal amongst infants, and far less so amongst adults. During the nineteenth century its mortality amongst children under five years of age has greatly declined, whereas amongst

adults it has not diminished to anything like so great an extent. The age-incidence of small-pox has shifted, so that the nearer one is to the period of vaccination, the less is the mortality.

During the eighteenth century small-pox was chiefly a disease of childhood. In the Chester epidemic of 1774 all the 202 deaths were those of children under ten years of age, and one-quarter were those of children under one year. In Warrington in 1773 all the deaths were under nine years. The records of St. Cuthbert's, Canongate, and Buccleuch Street, Edinburgh, burial-grounds show that, out of every 1,000 deaths from small-pox from 1764 to 1783, 993 were those of children under ten years of age. The same results are shown in other countries. It is unnecessary to give further figures on this point; it is admitted by all that this was the case.

Now, see how the age-incidence of the disease has altered since the adoption of vaccination. Taking the six great epidemics of Sheffield, London, Leicester, Gloucester, Dewsbury, and Warrington, we find there were altogether 11,065 cases. Of these, only 2,038 were in children under ten, and no less than 9,001 were in persons over that age—a striking difference to the case of the eighteenth century. And the case is even more remarkable if the vaccinated and unvaccinated are separated: 589 of the vaccinated were under ten, and 8,131 were over ten; but of the unvaccinated 1,449 were under ten, and only 870 over that age. When, however, we come to an epidemic amongst a community largely unvaccinated, as at Gloucester, we find a remarkable reversal of the age-incidence to eighteenth-century type of small-pox. Thus at Gloucester the figures were:

				Cases.
<i>Under Ten :</i>				
Vaccinated	...	...	...	26
Unvaccinated	...	...	...	680
<i>Over Ten :</i>				
Vaccinated	...	...	...	1,185
Unvaccinated	...	...	...	88

In other words, among the vaccinated the proportion of under to over ten years was 1 to 27. Amongst the unvaccinated it was 7 to 1.

Is it not more than a little remarkable that, whilst amongst the vaccinated small-pox has become more and more a disease of adults, amongst the unvaccinated it has reverted to its original type and become a disease of children, as it was in pre-vaccination days?

Fifthly, during the last hundred years the urban population of England has steadily—in some places enormously—increased, whilst the rural population has either dwindled or remained stationary. There has also been during the same period an enormous extension of movement and travel amongst all sections of the population. Both these conditions are such as would tend to an increased prevalence of infectious diseases. Yet, as we know, the most contagious of all diseases (excepting only plague)—small-pox—has enormously diminished.

Summarizing these arguments, thirteen out of the fifteen Commissioners (the two known anti-vaccinationists only dissenting) state that, 'upon the whole we think the marked decline of small-pox mortality during the first quarter of the nineteenth century affords substantial evidence in favour of the protective influence of vaccination.'

This, then, was the verdict passed by thirteen out of the fifteen Commissioners after a patient and exhaustive hearing of all the facts bearing on the matter. And this opinion is endorsed with practical unanimity by the medical profession throughout the world. The opponents of vaccination had long clamoured for a Commission, and this was the verdict pronounced by that Commission.

Now let us approach the question in another way. Let us see what is the comparative mortality from small-pox amongst the vaccinated and unvaccinated classes respectively; for, as we have already seen, vaccination, though a great, is not an absolute, protection against small-pox.

But even if it were no protection at all—if, in short, it left the person subjected to it every whit as liable to contract the small-pox as the unvaccinated, but rendered the disease of a milder and less fatal type—even then, I believe, most level-headed men would advocate its practice.

Now, there are some very striking facts which show that where vaccination has failed to prevent the occurrence of small-pox, it

has, nevertheless, so modified the disease as practically to rob it of all its terrors.

Small-pox tends from time to time to become epidemic, though the epidemics of the nineteenth century bear no comparison whatever, either in extent or virulence, to those of previous epochs.

There have been SIX such epidemics of note in England during the past century. These have occurred at Sheffield, London, Dewsbury, Warrington, Leicester, and Gloucester. Taking these six towns together, the figures relating to them are very considerable; in fact, they are large and substantial in amount. Therefore the conclusion we may draw from a study of them are more reliable than those drawn from a comparatively small number of cases. We may here state that any deductions drawn from a small number of cases are practically valueless. If small-pox broke out in a household of a dozen people, and caused one death amongst the vaccinated and two amongst the unvaccinated, I should attach little importance to those figures. Age, circumstances, environment, intercurrent disease, and many other things have here to be taken into account if a reliable deduction is to be made. But where the numbers are sufficiently large, these errors are obviated by the mass of cases.

We will now compare the fatality-rate amongst the two classes—the vaccinated and the unvaccinated—in each of these six towns.

I. SHEFFIELD.—ALL AGES.

Class.	No. of Cases.	Deaths.	Fatality.
			Per cent.
Vaccinated . . .	4,151	200	4·8
Unvaccinated . . .	552	274	49·6

IA. SHEFFIELD.—CHILDREN UNDER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
			Per cent.
Vaccinated . . .	353	6	1·7
Unvaccinated . . .	228	100	43·9

Notice here the striking difference between the mortality in children and adults. The nearer the period of vaccination the less fatal the disease.

IB. SHEFFIELD.—OVER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
			Per cent.
Vaccinated . . .	3,744	194	5.1
Unvaccinated . . .	322	174	54.2

'The facts recorded by Dr. Barry have been subjected to a severe scrutiny by the opponents of vaccination, but they have not, in our opinion, been materially displaced. It has been shown that three or four of those attacked have been included in the class of unvaccinated who ought to have been placed in the vaccinated class; but, on the other hand, it is probable, as Dr. Barry suggests, that of the doubtful cases which have been included amongst the vaccinated, quite as many ought to have been transferred from the vaccinated to the unvaccinated class. Many were put in the vaccinated class of whose vaccination there was very meagre evidence. Some, no doubt, may have been vaccinated after the date of the census, in which they were enumerated as unvaccinated. Making full allowance for this, we do not think it would modify the conclusion that the fatality was much higher amongst the unvaccinated than the vaccinated. It is obvious that a considerable transfer might be made from the one class to the other without altering the result in this respect.'

II. LONDON (1892).—UNDER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
			Per cent.
Vaccinated . . .	110	nil	nil
Unvaccinated . . .	228	61	26.7

IIA. LONDON (1892).—OVER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
			Per cent.
Vaccinated . . .	1,643	39	2.3
Unvaccinated . . .	181	38	20.9

III. DEWSBURY.—UNDER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
			Per cent.
Vaccinated . . .	44	1	2.2
Unvaccinated . . .	174	56	32.1

III. DEWSBURY.—OVER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . .	577	15	Per cent. 2·6
Unvaccinated . .	192	36	18·7

IV. WARRINGTON.—UNDER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . .	33	2	Per cent. 6
Unvaccinated . .	32	12	37·5

IV. WARRINGTON.—OVER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . .	560	36	Per cent. 6·4
Unvaccinated . .	36	12	33·3

V. LEICESTER.—UNDER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . .	2	nil	Per cent. nil
Unvaccinated . .	107	15	14

VI. LEICESTER.—OVER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . .	197	2	Per cent. 1
Unvaccinated . .	51	4	7·8

VIA. GLOUCESTER.—UNDER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . . .	26	1	Per cent. 3·8
Unvaccinated . . .	680	279	41

VIB. GLOUCESTER.—OVER TEN YEARS OF AGE.

Class.	No. of Cases.	Deaths.	Fatality.
Vaccinated . . .	1,185	119	Per cent. 10
Unvaccinated . . .	88	35	39·7

These figures show the influence of vaccination during six of the chief epidemics of the nineteenth century. They are in no way picked out; take any outbreak, any epidemic you like, and the result is invariably the same. Compare the fatality rates among the two classes for these six outbreaks. Among the vaccinated class (these, remember, having one single vaccination for the most part) the figures read as follows:

Adults.—5·1, 2·3, 2·6, 6·4, 1, 10.

Children.—1·7, nil (out of 110 cases), 6, nil, 3·8, 2·2.

Among the unvaccinated the figures read:

Adults.—54·2, 20·9, 33·3, 7·8, 39·7, 18·7.

Children.—43·9, 26·7, 37·5, 14, 41, 32.

The fatality amongst the vaccinated varied from nil to 10 per cent.; amongst the unvaccinated, from 7·8 to 54·2.

These figures were subjected to the severest possible scrutiny by the anti-vaccinators. Comment on them is unnecessary; they speak for themselves. As the Commissioners remark, 'if those who contend that vaccination is altogether inefficacious be correct, the fact that persons have been vaccinated can have no tendency to affect either their liability to be attacked or to die

of the disease. Those therefore selected as being vaccinated persons might just as well be so many persons chosen at random out of the total number attacked. So far as any connection with the incidence of, or mortality from, small-pox is concerned the choice might as well have been made according to the colour of the clothes they wore. How comes it, then, that those selected out of the mass merely because, on the hypothesis we are now considering, they have been the subjects of a wholly inefficacious and even mischievous proceeding, should suffer from attacks of small-pox so much less fatally than the mass from which they are drawn ?

This query, it is needless to state, has never yet received a satisfactory answer.

Lump together the figures for these six epidemics, and note the result. The unvaccinated class attacked amounted altogether to 2,321 persons. Of these 821, or 35·4 per cent., died ; 1,449 of these were under ten years of age, and of these 523 died, or 36 per cent. ; 870 were over ten years of age, of whom 299, or 34·3 per cent., died. Tabulated these figures read as follows :

I. UNVACCINATED.

Class.	Number.	Deaths.	Fatality.
			Per cent.
(a) Under ten . . .	1,449	523	36
(b) Over ten . . .	870	299	34·3

That is, the death for children and adults very nearly corresponds.

II. VACCINATED AND UNVACCINATED COMBINED.

Class.	Number.	Deaths.	Fatality.
			Per cent.
(a) All ages . . .	11,065	1,283	11·5
(b) Under ten . . .	2,038	539	26·4
(c) Over ten . . .	9,001	744	8·2

III. VACCINATED ONLY.

Class.	Number.	Deaths.	Fatality.
			Per cent.
(a) All cases . . .	8,744	461	5·2
(b) Under ten . . .	589	16	2·7
(c) Over ten . . .	8,131	445	5·4

That is, the death-rate amongst vaccinated children was about half (2·7) that of vaccinated adults (5·4).

Mr. Marson's figures at the London Small-pox Hospital during thirty-two years in respect of 19,467 cases show a fatality amongst the unvaccinated of 36·5 per cent.

Here are the figures for the same hospital for two different periods :

PERCENTAGE OF DEATHS ACCORDING TO VACCINATION
MARKS.

Class.	1836-51 (3,094 cases).	1852-67 (10,661 cases).
A.		
I. Stated vaccinated, but no cicatrix	21·7	39·4
II. Having one cicatrix	7·6	13·8
III. „ two cicatrices	4·3	7·7
IV. „ three „	1·8	3·0
V. „ four or more cicatrices	·7	·9
B.		
Unvaccinated	35·5	34·9

Surely the only deduction to be drawn by any unbiassed person from these figures is that vaccination does very materially lessen the fatality of small-pox, and these figures, it must be remembered, refer to cases of one single vaccination. It includes cases where the operation was performed thirty, forty, or even

fifty years before the supervention of small-pox, and where its protective influence has naturally lessened. When, however, we consider the subject of RE-VACCINATION, we shall see that the protection it confers is almost absolute.

Before we leave this subject let us see how small-pox may behave when it attacks an isolated community—*e.g.*, on ship-board, among people all living under the same sanitary conditions (except as regards vaccination), and where isolation of cases is impracticable.

The ss. *Preussen* was on a voyage to Australia when small-pox broke out. There were 312 persons on board, and the incidence of attack and the death-rate are shown by the following figures.

Class.	Cases.	Deaths.
Vaccinated and re-vaccinated (55)	4	0
Vaccinated once only (209)	45	3
Stated to be vaccinated, but having no scars (16)	2	0
Unvaccinated (19)	15	9

How Different Types of the Disease affect the Vaccinated and Unvaccinated respectively.

It has already been mentioned that small-pox varies very greatly in its severity in different attacks.

The most serious form of the disease is the malignant or *hæmorrhagic type*; next in order of severity comes the *confluent type*, in which the eruption is continuous—so-called because the ‘pocks’ run into one another; then comes the *coherent type*; then the *discrete*, in which the pustules are separated by areas of unaffected skin; and, lastly, the ‘*varioid*,’ or *modified type*.

This last is indeed a very mild form, frequently unattended by permanent pitting.

Now, it is obviously of great importance to know whether vaccination exercises any influence on the type of small-pox. The following tables show that it does.

I. SHEFFIELD EPIDEMIC (BOROUGH HOSPITAL).

Out of 825 vaccinated cases—

293 had 'varioid' small-pox	=	35.5 per cent.
413 „ discrete „	=	50 „
107 „ coherent „	=	13 „
12 „ confluent „	=	1.5 „

Now look at the unvaccinated in the same hospital.

Out of 280 unvaccinated—

None had 'varioid' small-pox.

50 „ discrete type	=	17.9 per cent.
175 „ coherent „	=	62.5 „
55 „ confluent „	=	19.6 „

Can anything be more convincing than the tale told by these figures as to the comparative severity of attack in the two classes? And it should never be forgotten that, although considerations of space preclude my giving the figures for the other towns, yet the same facts repeat themselves over and over again in the other epidemics. In every case the vaccinated class suffer chiefly from the milder forms of the disease, whilst, on the other hand, it is almost exclusively amongst the unvaccinated class that there occur those terrible manifestations of the disease that have made the name of small-pox so universally dreaded.

Taking children under 10 years of age only:

Out of 27 vaccinated—

22 had 'varioid'	=	81.5 per cent.
5 „ discrete „	=	18.5 „
None had either of the severe types.		

But out of 67 unvaccinated—

None had 'varioid' small-pox.

13 „ discrete „	=	19.4 per cent.
50 „ coherent „	=	74.6 „
4 „ confluent „	=	6 „

Revaccination.

There are some interesting facts relating to those who have been in close personal contact with cases of small-pox. Small-pox, as is well known, is extremely contagious; indeed, during the eighteenth century many physicians declared that they knew of hardly any cases where contact had not been followed by the contraction of the disease. Nevertheless, it is a well-proved fact that persons who have been successfully revaccinated almost invariably escape, no matter how close and continuous may be their contact with persons suffering from the disease.

In Sheffield 161 persons were in close contact with 1,798 small-pox patients during the course of a year. Of these 18 had previously had the disease, and none of them contracted it again. One vaccinated in infancy had a very mild attack of 'varioid,' so mild, indeed, as not to necessitate his going to bed for it—a good example of 'modified' small-pox.

Sixty-two others were vaccinated in infancy, and of these 6 were attacked and 1 died. *Of the remaining 80, all of whom had been revaccinated, not one contracted small-pox.*

At Warrington, during the epidemic, amongst 800 persons residing in the barracks, one only contracted small-pox, whilst amongst the revaccinated police and postal forces there was not a single case.

During the thirty-five years prior to 1871, on the authority of Mr. Marson, not a single case occurred amongst the *revaccinated nurses and attendants* at the Highgate Small-pox Hospital—*i.e.*, amongst those in daily and hourly contact with the disease. Since 1871 there has been one case, giving a record of one case for sixty years.

At the Homerton Small-pox Hospital, from 1871-1877, 366 persons were employed, all of whom were revaccinated, except one nurse. *This nurse contracted small-pox in a month.*

At the Western Hospital (London) 362 attendants were employed, 48 of whom had previously had small-pox. Of the remaining 314, 7 contracted small-pox; but of these, 2 had not been revaccinated, another 2 had been unsuccessfully done (and therefore not done at all), whilst a fifth was not done until the fifth day after resuming duty. Of 42 men employed in ambulance work at this hospital, 1 contracted small-pox. He had not been revaccinated.

Year.	Metropolitan Asylums Board's Fever Hospitals.*			Metropolitan Asylums Board's Small-pox Hospital-ships.		
	Number of Attendants employed either temporarily or otherwise in the course of the Year.	Of whom there contracted Scarlet Fever, Diphtheria, † or Typhoid during the Year.		Number of Attendants employed either temporarily or otherwise in the course of the Year.	Of whom there contracted Small-pox during the Year.	
		Number.	Proportion.		Number.	Proportion.
1884	} Figures not available.			283	4 †	1·4
1885				240	0	0
1886				110	0	0
1887	1,103	37 †	3·4 †	55	0	0
1888	} Figures not available.	35	—	46	0	0
1889		42	—	53	0	0
1890		53	4·0	64	0	0
1891	1,160	68	5·9	64	0	0
1892	1,652	121	7·3	138	2	1·4
1893	2,175	121	5·6	320	6	1·9
1894	2,182	111	5·1	289	0	0
1895	2,514	116	4·6	274	0	0

* Excluding the Gove Farm Hospital, opened in 1890. In the years 1893, 1894, and 1896, both scarlet fever and small-pox convalescent patients were admitted into that hospital, and the only available figures as to the staff do not enable us to distinguish between those employed in or about the fever, and those in or about the small-pox, wards.

† Cases of diphtheria, as such, were not admitted into the Metropolitan Asylums Board's hospitals prior to October, 1888, though a few cases of that disease, sent in as fever cases, had been admitted in the earlier part of that year and in the previous year. Three attendants who contracted diphtheria in 1887 have not, therefore, been included in the number (37) and proportion (3·4 per cent.) given in the second and third columns of the above table against the year 1887.

‡ Not re-vaccinated until after admission to hospital, and after exposure to small-pox.

Of 2,198 persons employed at the London small-pox hospitals from 1884 to 1900, during which period 17,900 cases were received, only seventeen persons contracted small-pox, of whom thirteen were not revaccinated until after they had joined the ships, and four were workmen who escaped notice. Not one single member of the staff of the hospital ships has ever died of small-pox, and for the past eight years (to 1901) not one has suffered from the disease. Out of 14,800 small-pox patients received during the epidemic of 1870, 1871, and 1872, only four well-authenticated cases were treated in which revaccination had been performed, and these were all light attacks. From 1881 to 1901, 1,282 persons have been employed in AMBULANCE service. Four of these contracted small-pox. One of these escaped revaccination: he died; one was unsuccessfully revaccinated: she died; the other two recovered.

These are a few typical examples of how revaccination protects those in close contact with small-pox.

But it may be urged that hospital nurses and attendants escape other infectious diseases. Let us therefore see if such is the case. Before giving the figures, however, it is well to remember one important difference between small-pox and scarlet fever. Small-pox, being nowadays a very rare disease, it is extremely uncommon to find adults who are protected by a previous attack of the disease (we have seen that second attacks of small-pox, though not unknown, are, indeed, extremely rare); but scarlet fever is one of the commonest diseases of childhood. It would not be an exaggeration to say that a very large proportion of adults—probably more than a half—are protected from its influence by a previous attack. Therefore the point is this: an adult going into close contact with cases of scarlet fever—*ceteris paribus*—is less likely to contract the disease than an adult going into an atmosphere of small-pox. The one is usually protected by a previous attack, the other is not. *A priori*, then, one would think they would come off better against scarlet fever than against small-pox. But they don't. Here are the figures (see table on p. 27).

How can one possibly explain the difference in the liability to be attacked by small-pox and scarlet fever respectively, unless on the assumption that revaccination is an effective safeguard? The question awaits an answer. As the Commissioners say, 'it

is clear that small-pox stands apart from all other contagious diseases in relation to attacks among the staff.'

Last of all, the following tables, showing the liability to small-pox amongst the army, navy, the police force, and the post-office employes, and also the comparison between the Prussian and Austrian armies, should convince all but the absolutely biased of the value of vaccination and revaccination.

The following table shows the attack-rate of, and mortality from, small-pox amongst the troops in the United Kingdom during each of the years 1847-1894 :

Year.	Attacks of Small-pox to every 10,000 of the Strength.	Deaths from Small-pox to every 10,000 of the Strength.	Year.	Attacks of Small-pox to every 10,000 of the Strength.	Deaths from Small-pox to every 10,000 of the Strength.
1847 .	18	1.0	1871 .	23	2.3
1848 .	26	1.6	1872 .	14	1.4
1849 .	25	3.2	1873 .	1	.1
1850 .	14	.7	1874 .	1	0
			1875 .	.6	.1
1851 .	14	.8	1876 .	3	.2
1852 .	30	2.1	1877 .	3	.4
1853 .	20	2.2	1878 .	2	.1
1854 .	41	4.5	1879 .	1	0
1855 .	47	3.8	1880 .	.4	0
1856 .	12	.4			
1857 .	12	1.0	1881 .	3	.2
1858 .	32	1.8	1882 .	2	.1
1859 .	24	1.0	1883 .	1	0
1860 .	14	.7	1884 .	1	0
			1885 .	2	.3
1861 .	6	.4	1886 .	1	0
1862 .	8	.4	1887 .	1	.1
1863 .	16	.8	1888 .	1	.1
1864 .	15	1.4	1889 .	.2	0
1865 .	12	.8	1890 .	0	0
1866 .	5	.1			
1867 .	5	.1	1891 .	.1	0
1868 .	9	.3	1892 .	6	0
1869 .	1	0	1893 .	.8	0
1870 .	3	.1	1894 .	1	0

Since the year 1858 it has been the practice in the army to vaccinate every recruit on joining the service, whether previously

Wp to Duke

vaccinated or not, except those bearing distinct marks of small-pox. During the years following 1858, therefore, as men previously recruited from the army, the proportion of the strength who had been vaccinated since enlistment increased, until, in somewhere about ten years' time, the earlier recruits had, with comparatively few exceptions, left the army.

During the period 1847-1858 the death-rate from small-pox amongst the troops in the United Kingdom, though varying from year to year, does not appear to us to have given evidence of decline. Speaking generally of the period 1859-1894, the growth of the proportion of the strength who had been vaccinated since enlistment was accompanied by a decline in the death-rate from small-pox, and the lessened death-rate has on the whole continued during those later years of the period in which that proportion has presumably been maintained at its highest.

The following table shows the attack-rate of, and mortality from, small-pox among the British troops in the colonies from the year 1860 onwards :

Year.	Attacks of Small-pox to every 10,000 of the Strength.	Deaths from Small-pox to every 10,000 of the Strength.	Year.	Attacks of Small-pox to every 10,000 of the Strength.	Deaths from Small-pox to every 10,000 of the Strength.
1860 .	8	1.0	1878 .	1	.4
			1879 .	.3	0
1861 .	12	.9	1880 .	2	.4
1862 .	15	2.3			
1863 .	5	0	1881 .	0	0
1864 .	16	1.5	1882 .	1	0
1865 .	12	1.1	1883 .	3	0
1866 .	7	0	1884 .	.5	0
1867 .	8	0	1885 .	1	0
1868 .	10	.3	1886 .	0	0
1869 .	4	0	1887 .	1	0
1870 .	8	1.3	1888 .	3	0
			1889 .	2	0
1871 .	51	7.0	1890 .	0	0
1872 .	.5	0			
1873 .	3	.5	1891 .	2	0
1874 .	2	0	1892 .	0	0
1875 .	5	0	1893 .	2	0
1876 .	0	0	1894 .	1	0
1877 .	.4	0			

The following table shows the attack-rate of, and mortality from, small-pox amongst the British troops in India during the same period :

Year.	Attacks of Small-pox to every 10,000 of the Strength.	Deaths from Small-pox to every 10,000 of the Strength.	Year.	Attacks of Small-pox to every 10,000 of the Strength.	Deaths from Small-pox to every 10,000 of the Strength.
1860 .	25	2·9	1878 .	12	2·3
1861 .	40	6·1	1879 .	6	·6
1862 .	6	·8	1880 .	1	·2
1863 .	8	1·8	1881 .	3	·2
1864 .	21	2·9	1882 .	8	·7
1865 .	21	2·6	1883 .	19	1·6
1866 .	6	1·0	1884 .	14	1·4
1867 .	8	·9	1885 .	2	0
1868 .	8	0	1886 .	4	·2
1869 .	28	3·2	1887 .	6	·3
1870 .	4	·9	1888 .	15	1·5
1871 .	2	·2	1889 .	22	2·5
1872 .	9	1·9	1890 .	5	·6
1873 .	14	1·9	1891 .	2	·2
1874 .	8	1·3	1892 .	3	·4
1875 .	2	·3	1893 .	5	·6
1876 .	3	0	1894 .	2	·4
1877 .	7	·3			

The table on page 32 shows the attack-rate of, and mortality from, small-pox in the navy, wherever stationed, during each of the years 1860-1894.

Information of great importance is derived from an observation of the apparent effect of the law which was passed in Prussia in the year 1874 making revaccination compulsory. Since that period small-pox mortality in that country has been reduced to proportions quite insignificant as compared with any previous epoch. It is instructive in this connection to compare the deaths from small-pox per 100,000 of the population in Prussia and Austria. The deaths do not, of course,

GENERAL OFFICE

Year	Number of Cases of Small-pox	Number of Deaths from Small-pox
1841	1	0
1842	2	0
1843	4	0
1844	11	1
1845	1	0
1846	1	0
1847	1	0
1848	1	0
1849	1	0
1850	1	0
1851	1	0
1852	1	0
1853	1	0
1854	1	0
1855	1	0
1856	1	0
1857	1	0
1858	1	0
1859	1	0
1860	1	0
1861	1	0
1862	1	0
1863	1	0
1864	1	0
1865	1	0
1866	1	0
1867	1	0
1868	1	0
1869	1	0
1870	1	0
1871	1	0
1872	1	0
1873	1	0
1874	1	0
1875	1	0
1876	1	0
1877	1	0
1878	1	0
1879	1	0
1880	1	0
1881	1	0
1882	1	0
1883	1	0
1884	1	0
1885	1	0
1886	1	0
1887	1	0
1888	1	0
1889	1	0
1890	1	0

General Post Office.

Year	Number of Individuals Employed	Number of Cases of Small-pox	Number of Deaths from Small-pox
1841	2,254	None.	None.
1842	2,168	2	None.
1843	2,511	4	None.
1844	30,490	11	1

correspond year by year; sometimes they are higher in one country than in the other, and, upon the whole, the mortality shown is greater in the case of Austria than of Prussia, but in the period prior to 1874 there is no contrast to be found such as is observable since that year. The figures for 1874, and for some

years prior and subsequent to that date, are worth placing side by side.'

Year.	Prussia.	Austria.	Year.	Prussia.	Austria.
1862 . .	21·06	31·14	1872 . .	262·37	189·93
1863 . .	33·80	53·10	1873 . .	35·65	323·36
1864 . .	46·25	84·78	1874 . .	9·52	178·19
1865 . .	43·78	45·53	1875 . .	3·60	57·73
1866 . .	62·00	36·85	1876 . .	3·14	39·28
1867 . .	43·17	74·08	1877 . .	0·34	53·18
1868 . .	18·81	33·27	1878 . .	0·71	60·59
1869 . .	19·42	35·18	1879 . .	1·26	50·83
1870 . .	17·52	30·30	1880 . .	2·60	64·81
1871 . .	243·21	39·28	1881 . .	3·62	82·67

It will be seen that, whilst in the Austrian army, where re-vaccination is not compulsory, small-pox still maintains its prevalence, in the Prussian army it has practically disappeared, and its disappearance dates from the time that revaccination was made compulsory (*i.e.*, 1874).

2. THE ALLEGED DANGERS OF VACCINATION.—VACCINATION WITH ANIMAL VACCINE.

It is urged by the opponents of vaccination that it has dangers of its own, quite apart from its value—or the reverse—as a preventative against small-pox. This was one of the points the Royal Commission were required to investigate—*viz.*, 'The objections made to vaccination on the ground of injurious effects alleged to result therefrom, and the nature and extent of such effects.' Probably about nine-tenths of the opposition to vaccination arose from a belief in its fancied dangers.

Now, even if it could be proved that there was an appreciable element of risk in the operation, I believe that the majority of men would accept that risk for their own safety and the safety of the community (granting the beneficial action of vaccination in relation to small-pox).

But it is easy to show that the risk is insignificant. What are the dangers which surround vaccination? The Royal Commission's finding on this point was the following:

'That although some of the dangers said to attend vaccination are undoubtedly real and not inconsiderable in gross amount, yet when considered in relation to the extent of vaccination work done they are insignificant. There is reason, further, to believe that they are diminishing under the better precautions of the present day, and, with the addition of the further precautions which experience suggests, will do so still more in the future.'

These remarks refer, of course, to the old arm-to-arm method of vaccination.

The untoward results which may follow it, or which are alleged to follow it, are:

- I. The accidents to which every scratch, however small, is liable—viz., an inflamed arm, consisting of a varying amount of inflammation of the cellular tissues, and generally spoken of as 'a bad arm.'

II. *Erysipelas.*

I. and II. may ensue after carelessly-performed vaccination—more particularly where proper precautions are not taken to protect the vesicles—either with humanized or calf lymph. 'An examination of the percentage during the first and second six months of life of the total mortality from erysipelas during the years 1855 to 1863, as compared with the years 1864 to 1887, has been obtained from the Registrar-General for Scotland. In that part of the United Kingdom vaccination seldom takes place much before the age of six months. The period first selected is that preceding the Act making vaccination compulsory in Scotland. An examination of this return certainly does not lend any countenance to the view that vaccination exercises a serious influence on the mortality from erysipelas. In the earlier period the percentage of deaths within the first six months to the total deaths was 28·36; in the second period it was 28·88. In the earlier period the similar percentage relating to the second six months of life was 5·02; in the later period it was 5·35. The changes, it will be seen, are very slight. There is certainly nothing to show that a new cause for gravely-increased

mortality had come into existence during the later period. It is worth turning again to the Leicester statistics.

Comparing the years 1883 to 1887 with the years 1863 to 1867, we find that, whereas in England and Wales there had been a decrease in the twenty years of 16·7 per cent. in the infant mortality from erysipelas, there had been at Leicester an increase of 41·5 per cent. As before observed, the comparison is made between Leicester and the whole of England and Wales, but this does not appear to us materially to vitiate the comparison for the purpose of disproving the allegation that there has been a substantial increase in mortality from erysipelas due to vaccination.

It may well be that in some cases vaccinated children have suffered fatally from erysipelas who, but for the operation of vaccination, would not have been attacked by the disease. This is a point we shall have to consider presently. But the evidence is, in our opinion, conclusive to show that there has not been during the last forty years any material increase of deaths from erysipelas owing to vaccination.'

III. The introduction of certain diseases specified in detail later on. This accident is only possible when humanized lymph is used, and, as already stated, the use of calf lymph since 1898 has been made compulsory on all public vaccinators.

Let us first of all discuss a very general proposition. If vaccination is surrounded by so many dangers, as some allege, the result of these dangers should be shown in the death-rate amongst infants, who are the chief subjects of vaccination.

Has the infantile death-rate increased or decreased during the period during which vaccination has been practised? During the period in which it has been in vogue the infantile death-rate has decreased.

A slightly-inflamed arm is perhaps the commonest accident to which the operation of vaccination is liable. It is also probably the commonest cause of hostility to the practice. A child is vaccinated, and the arm takes freely; about the ninth or tenth day there is an areola of redness around the vesicles, and possibly a zone of congestion extending down to the elbow. The mother describes it as a 'bad arm,' and, indeed, it looks very angry and inflamed. She shows the arm to her neighbours, who all become

anti-vaccinationists. Yet in a few days all the inflammation will have subsided of itself, or sooner if some cooling lotion be applied. Every scratch and every abrasion is equally liable to be infected by septic matter in the same way as the scratch used in vaccination—for it is but a scratch, according to the method of operating now generally adopted. But the number of cases in which an ordinary scratch is followed by any untoward results compared to the total number of scratches inflicted is ridiculously insignificant. They represent the normal risks of existence. These accidents *may* happen to any scratch, rare though they are; they have nothing whatever to do with vaccination itself, which is the introduction of certain lymph into the system. They simply teach us that care is necessary, and that cleanliness is essential for every breach of surface; care on the part of the operator and care on the part of the patient. Of course, if one wears a coloured blouse or shirt next to the skin, one must not be surprised if unpleasant developments follow vaccination.

Secondly, we turn to the most serious objection which can be raised against vaccination on the ground of danger. It is the fact that a certain number of deaths are returned each year as 'being connected with vaccination.' The number, fortunately, when we bear in mind the immense numbers vaccinated, was even under the old methods infinitesimal. From 1881 to 1889 the numbers of deaths ascribed to this cause was 476.

During the same period there were 6,739,902 primary vaccinations.

This gives a proportion of 1 death to every 14,159 primary vaccinations—not a very alarming proportion.

In Scotland the number of deaths ascribed to the same cause during the years 1883 to 1890 was 22, and the number of primary vaccinations during the same period was 855,185, giving a proportion of 1 death to every 38,872 vaccinations. About half these deaths were due to erysipelas infecting the vaccination wound. The annual death-rate from erysipelas unconnected with vaccination is: Under three months, 1,900 per 1,000,000; from three to six months, 774 per 1,000,000; and from six months to one year 268 per 1,000,000. From this it will be seen that erysipelas in children is not at all an uncommon disease.

This, then, is the worst that can be advanced against vaccina-

tion—a proportion of 1 death in 14,159 vaccinations in England, and 1 death in 38,872 vaccinations in Scotland. We have dwelt somewhat on these figures, because it is better that the public should know the actual risk—slight though it be—than remain in ignorance, and allow the dangers to be magnified by misleading statements from its opponents.

These figures refer, of course, to the old method of vaccination. Since 1898 a great improvement has taken place.

The difference in the proportion of deaths between England and Scotland can very likely be accounted for by the different practice obtaining in the two countries. In England, until 1898, the age for vaccination was before the third month; in Scotland it need not be done until the sixth month.

There is every reason to anticipate that since the age has been to four months in England the figures for that country will approximate to those for Scotland.

Thirdly, it has been argued from time to time that various constitutional diseases may be transmitted by vaccination. Syphilis, leprosy, tuberculosis, cancer, scrofula, eczema, etc., have all been credited to vaccination.

Now, since 1898 any danger of this kind has become absolutely a thing of the past, and parents need have no dread whatever of their healthy offspring being contaminated by impure lymph taken from another child. Calf lymph alone is now used. Yet, to remove a reproach from the practice of vaccination, it may be as well to see what was the danger of diseases being transmitted by humanized lymph. First of all it may be laid down that there never was any danger of scrofula, tuberculosis, eczema, or leprosy being introduced by vaccination. Not a tittle of evidence could be produced before the Royal Commission to support this view.

Syphilis stands on a different footing. Inherited cases of the disease are pretty common, and during the years 1886 to 1891 five deaths were put down as being 'connected with syphilis.' Under close investigation, however, the evidence was very doubtful in every case except one.

To summarize, then, the alleged dangers of vaccination, there is, first, the possibility of an inflamed arm, and, secondly, a risk of erysipelas, so slight that most people would disregard it as one

of the ordinary risks of daily life. Now that calf lymph has been substituted for human lymph, the transmission of certain diseases is no longer even theoretically possible.

A few remarks on certain diseases of infancy may not be inappropriate, if they serve to dispel some very widely-held prejudices.

Most children who are born apparently healthy exhibit, as a rule, no signs of disease during the first few months of life. About the third or fourth month they are vaccinated; about the six month the troubles of teething commence, and from this period to the end of the first eighteen or twenty months the child's system is in a state of almost continual irritation. Few children escape some evidences of this. Coughs and bronchitis are common, eruptions on the skin are common, eczema is common, diarrhoea is common, and so are many other infantile complaints. It will be noticed that all these come SHORTLY AFTER the period at which the child is vaccinated, and yet because these, the common accompaniments of the teething period, follow vaccination, vaccination gets the discredit of their occurrence.

Most people, unfortunately, do not distinguish between *post hoc* and *propter hoc*. With some people everything that follows vaccination must be due to it. A child is vaccinated when three months old; a month later it dies of, say, eczema or bronchitis. A certain class of newspaper reports the case under the heading of 'Death after Vaccination.' This is simply dishonest. Most of us, in one sense, die after vaccination, but the practice of putting everything that follows to its discredit is utterly unfair. Nevertheless, the harm is done, and nothing but a careful, unprejudiced study of the real facts can undo it. Yet few take the trouble to do this. They have seen it stated 'in the papers' that a child has died after vaccination, and their minds are made up. One solitary misleading, or even untrue, statement is more to them than the reasoned opinions of 20,000 medical men, whose word on every other matter relating to health or disease is law.

In conclusion, I would urge upon all those who are wavering upon the subject the fact that there is practical unanimity amongst medical men in every country as to the value of vaccination. The exceptions are so insignificant that it cannot with any degree of truth be said that this is a subject on which

doctors differ. And, further, no medical men are more emphatic in their belief of its efficacy than those who have had personal experience of a small-pox epidemic, and have seen it put to the test. This alone should be food for thought for all thinking individuals. Is it likely that, not only in our own land but among every civilized community, a numerous body of men, well educated, experienced, trained by their very occupation to weigh evidence, and admittedly entitled to the public confidence, should combine together to support a useless and even harmful practice? The suggestion sometimes made by the less reputable opponents of vaccination that it is a question of fees is beneath contempt.

An immense number of medical men—all the consulting physicians, the consulting surgeons, the specialists of every kind, the operating surgeons—all these, who never vaccinate a single person from one year's end to another, are staunch upholders of vaccination. Where is their pecuniary interest in the practice? And as to the ordinary medical practitioner, the rank and file of the profession—how is he affected by this argument? Why, except when an epidemic of small-pox occurs, which is perhaps once in a generation in any given town, and when all the anti-vaccinators are tumbling over one another in their eagerness to have 'bad arms,' and run all the terrible risks of the operation, the amount he derives from the practice is utterly insignificant and paltry, probably about as much as he derives from signing School Board certificates or notifying infectious diseases. He simply vaccinates the children of those whose confinements he has attended. And for the few pounds they receive for doing this, the whole medical profession in every country is willing to prostitute itself—and be it noted, to vaccinate itself—to bolster up a useless and even harmful fad, to force a practice in which it does not believe on an unwilling community. Is this the attitude of a profession which enjoys the confidence and esteem of the public in every other respect? Are they traitors in regard to vaccination only? Is it likely, is it conceivable, that a body of 20,000 men, belonging to what is by universal consent a noble profession—men inspired by the highest motives, men who perform a large share of their work gratuitously, whose services are ever at the call of the poor and

needy—would band themselves together, for the sake of some paltry gain, simply in order to continue a useless practice?

I have appealed to authority as an argument in favour of vaccination; I have said that it is a question on which medical opinion is unanimous. In answer to this, it has been advanced that authority in other matters has sometimes been shown to be wrong—that, for example, Galileo showed that the authority of the savants and philosophers of the Roman Church was wrong—that blood-letting was once in almost universal vogue—therefore, say those who urge this argument, may not authority in the present instance be at fault?

This is a very specious argument, and one well adapted to influence the more thoughtful of the laity, but there is no true analogy in either case.

Vaccination was not discovered by any great authority of medicine, but by a humble country medical practitioner, and it won its way all over the world by its own intrinsic merit. It has stood the test of over a century, and now, in the year 1902, medical opinion, with a hundred years' experience of its value, is more than ever in favour of it.

How different is the case of Galileo! Here we have a purely speculative theory about the motions of the heavenly bodies—a theory which it was impossible to investigate even until the introduction of the telescope, and, more than all, a theory which, in the opinion of the Fathers of the Church, rested on the imperishable words of Holy Scripture which it was impious and even blasphemous to question. Is there much analogy between the overthrow of such a theory by a layman and the case of vaccination? Can any medical tenet which has been held and practised for a century be instanced which a layman has shown to be wrong?

And with regard to blood-letting, it should be remembered that its use and value are not in any way impugned by medical opinion. Its use is circumscribed certainly, but its value in certain conditions is unquestioned. It was its abuse which was abandoned.

In the present state of the law in this country a heavy responsibility rests upon the shoulders of every parent. If he likes he may, before his child reaches the age of four months, go before a

magistrate, and make a declaration that, in his opinion, he has a conscientious objection against vaccination; and if he but words his declaration correctly, that magistrate has no option but to comply with his demand. This present Government have shifted their responsibility, and placed it on the shoulders of every parent, and have left him to decide whether or not his child shall be vaccinated.

To all such who may have to decide this question I would urge two considerations: First, do what you would in any other question affecting the health of your child—viz., ask the opinion of your trusted medical adviser. Remember that his is no mere academic belief in the efficiency of vaccination; he practises it on his own person, and he deliberately submits his children to it. Surely, then, where he, with his knowledge—which must in the immense majority of cases be greater than yours—is willing to accept the infinitesimal risk which vaccination may entail in order, as he firmly believes, to protect himself and his children from the ravages of a fell disease, there should be no hesitation on your part. But if, however, you cannot do this—if you are unwilling or unable to accept the collective wisdom and intelligence of a learned profession, but if you prefer to judge for yourself and settle the question for yourself—then, indeed, I would urge you with all my might not to accept the misleading statements so persistently put forth by certain propagandists, not to be misled by false or exaggerated accounts of its dangers, not to be led aside from the main question by diatribes about lymph faddists or serum therapeutics, but to go to the fountain-head for light on this question; study the Blue-books, learn what vaccination really does, read the Report of the Royal Commission, of which this book is but an abstract. There you will find England's experience of vaccination during the past century; there you will find the best that can be said for it and the worst; there you will find only proved facts. For whatever is there has had to stand the fiercest light and the severest criticism that could be brought to bear upon it.

If you will do this honestly and with an impartial mind, I have no fear of the result. Truth is great and will prevail. But remember your child cannot choose. The choice is yours, and so must be the responsibility. And if your decision is founded on

ignorance or prejudice, and you leave him unprotected, as we doctors honestly believe him to be, and if the scourge of small-pox in later years visit your neighbourhood and he falls a victim and die, or emerge from its clutches with all traces of beauty gone, what, then, will be your thoughts, what your unavailing remorse? Truly I would not care to be in such a father's place when he learns, as learn he must if he studies facts, that, at the cost of a little temporary inconvenience, he has wrecked the happiness of his home.

But a still heavier load of responsibility must rest on those who have so misled the opinion of the masses as to cause them to be either hostile or indifferent, who have suppressed and distorted facts so as to create a false clamour, which this Government, with its 140 majority, mistook for the voice of the people: A terrible awakening, as at Gloucester, awaits them!

ADDENDUM

THE Registrar-General, in his weekly returns, publishes the following table, in which the deaths from small-pox which have been registered from the beginning of the present epidemic down to January 11, 1902, are classified in minuter detail as regards vaccination than was possible at the date of issue of the several weekly returns :

	Ages at Death.								
	All Ages.	Under 1 Year.	1 to 5.	5 to 10.	10 to 15.	15 to 20.	20 to 40.	40 to 60.	60 and upwards.
Vaccinated in infancy only	130	—	—	—	1	3	76	45	5
Revaccinated more than ten years ago	3	—	—	—	—	—	1	1	1
Revaccinated less than ten years ago	—	—	—	—	—	—	—	—	—
Vaccinated only after infection by small-pox	14	7	2	—	—	1	4	—	—
Unvaccinated	116	10	35	14	16	15	19	6	1
No evidence of vaccination	9	—	—	—	1	—	5	3	—
Stated to have been vacci- nated; scars, if any, ob- scured	28	—	—	3	1	—	12	10	2
Total	300	17	37	17	19	19	117	65	9

The table shows (the Registrar-General points out) that, out of those children and young persons under twenty years in the population of London who were not protected by vaccination, 100 have recently died of small-pox, whilst only 4 deaths from that disease have occurred among those of the same ages who were ascertained to have been vaccinated in infancy. There are

also 5 cases in which the evidence was insufficient to warrant a definite statement as to vaccination. If the extreme course be taken of counting these 5 cases with the vaccinated, the figures will show at least 100 deaths from small-pox among the unvaccinated section of the population under twenty years of age, and at most 9 deaths among the vaccinated section at the same ages.

At ages over twenty years there were 30 deaths of persons who were admittedly unvaccinated, 126 of persons who had been vaccinated in infancy, but not revaccinated, and 3 of persons who had been revaccinated. In all these 3 cases revaccination had taken place more than ten years ago, and in 2 of them it is uncertain whether the operation was successful. There are also 32 cases at these ages in which the facts as to vaccination could not be definitely ascertained. In 24 of these cases statements were made to the effect that the deceased had been vaccinated, but in none of them was it claimed that the deceased had been revaccinated.

THE END.



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